9 Metals and Materials Used in EMI Shielding | ID Group

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20 Feb 9 Metals and Materials Used in EMI Shielding

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Electromagnetic interference (EMI) is a nuisance that causes electronic devices to malfunction or even stop working. Some products have been specifically designed to protect devices from EMI. The shape, thickness and composition of these products are just a few of the factors that influence their ability to block EMI depending on the application and desired result. We will examine here the nine best EMI shielding metals and materials used to effectively block harmful electromagnetic interferences.

The Importance of EMI Shielding

Modern electronic devices emit energy, usually magnetic or electrical. EMI shielding materials protect sensitive electronic devices from interference. The shielding material won't allow the electric or magnetic current to get through to the inner workings of the device. In cell phones, EMI shielding prevents static and background noise, which is inconvenient, but not serious. EMI shielding is even more important in medical devices or aviation equipment as it can prevent a catastrophic failure.

The most common EMI shielding is in the form of metal gaskets. Gaskets can be customized to any application and configured to meet your sizing needs, seal types, compositions, and mounting options. When attenuation is a concern, there are shielding options that can meet those needs. Start by understanding the materials involved and what capabilities they inherently have.

Considerations and Impact of Material Used

When choosing the right EMI shielding product and material for your application, the following three elements must be considered: the interferences to be blocked, the environment in which the device will operate and the budget allocated. The key is to find the right balance between design, performance and cost.

As mentioned previously, EMI products can be designed and configured in multiple ways, including EMI honeycomb vents, fabric gaskets, fingerstock gaskets, etc. Choosing the right material for your EMI product is very important to help you effectively protect your device. Material inherent factors to consider when selecting an EMI shielding product include its shielding effectiveness, galvanic compatibility, conductivity, anti-corrosion properties, weight and durability. The selected material and EMI product design will have a direct effect on project cost and application performance.

Metals Used in EMI Shielding

Several types of materials are used in the manufacturing of EMI RFI shielding products. Here are nine of the most important ones.

Copper

Copper is an ideal metal for EMI shielding due to its versatility. It can block both radio and magnetic waves. The metal is very malleable, so it can be shaped and used in a variety of places. It is used in medical devices as well as personal computer equipment. Copper can also be combined with other metals to work even better as an EMI shield. It needs to be combined with another metal to be more resistant to corrosion.

Beryllium Copper

This alloy increases the shielding effect of copper, strengthening its properties and making it more durable. Beryllium copper is more corrosion-resistant than copper alone. It can also tolerate UV rays and moisture. It works well in device mechanisms that will open and close a lot because it has mechanical spring properties. Learn more about beryllium copper and EMI shielding.

Copper Alloy/Alloy 770

Alloy 770 consists of copper, zinc, and nickel, and has significant corrosion-resistant properties. It's effective for EMI shielding and has a high tensile strength. Copper alloys are often referred to as Nickel Silver, even though they don't contain any silver.

Stainless Steel

Stainless steel is a stiffer material than other metal options, but it is less expensive than other choices. It is highly corrosive-resistant and tolerates high temperatures, well. It doesn't have the conductivity of other metals though. It is useful in some applications, so don't rule it out. When woven with polyester staple fibres, it may be useful for shielding certain home electronics and electrical appliances.

Aluminum

Aluminum is a popular EMI shielding material, because it has a high strength-to-weight ratio, making it very durable. It's easy to form. It can be manipulated into many different shapes for the best results. Aluminum is non-ferrous, resistant to corrosion, and cost-effective.

Pre-Tinplated Steel

Pre-tinplated steel is steel that is covered with a layer of tin, making it less susceptible to rust. Tin also increases the soldering capability of the part. Pre-tinplated shielding is cost-effective, but it only protects against lower

frequency EMI, so it may not be appropriate for all applications.

Nickel

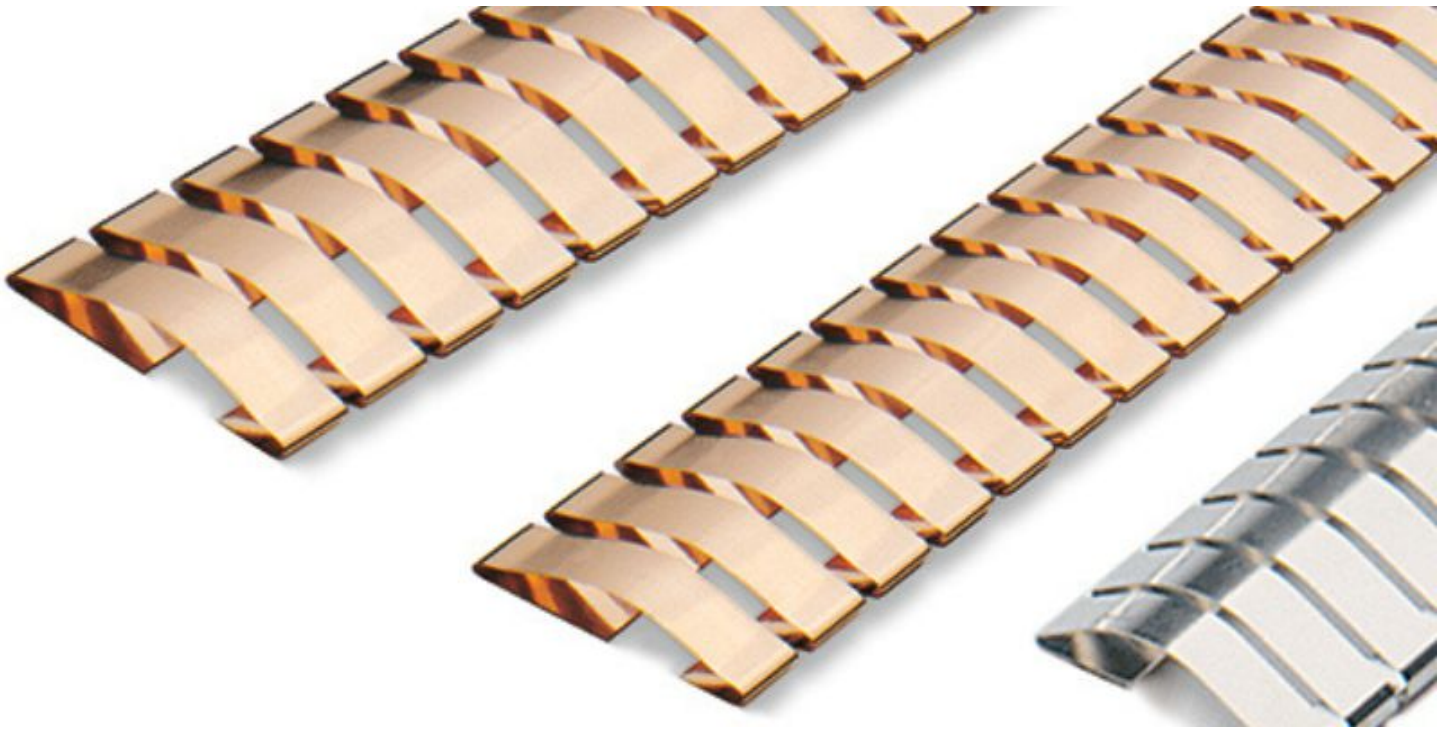
Nickel is another versatile and affordable metal for EMI shielding. You can use nickel as plating or add it to other metals to increase conductivity. The drawback is that nickel is more effective in lower frequency applications. It might not work in places that have higher frequency EMI.

Monel

Monel is an alloy made of nickel and copper combined with small amounts of iron, manganese, carbon and silicone. Stronger than nickel, it offers great corrosion resistance, good conductivity and excellent mechanical characteristics such as tensile strength and aging properties. However, Monel is not recommended for applications contacting aluminum in harsh environments.

Mu-metal

Mu-metal is an alloy, typically made of nickel and iron. Mu-metal is malleable, making it easy to work with. It can be made into thin sheets that can be used in many applications. It shields both electronic and magnetic fields.



Metal Combinations

Although metals are very good shielding materials, they are sometimes not suitable for certain applications in their pure form. Their lack of flexibility and elasticity as well as their weight are all obstacles for some

applications.

Fortunately, there are options on the market that combine one or more metals with other materials such as silicone, polyurethane and neoprene to form more flexible and lightweight EMI products that do not require welding.

For example, mesh composite gaskets are made of knitted wire mesh made of metal over an elastomer core of neoprene, silicone, or polyurethane. Metalized fabric gaskets can be used as economical gaskets and are normally supplied on spools or cut to length.

In applications that require a low compression force, conductive foam gaskets are a suitable solution. Conductive foam gaskets normally consist of open-cell polyurethane foam plated with nickel and copper.

Finally, conductive elastomers are another metal combination made of silicone elastomers filled with conductive metal particles. Conductive elastomers can be found in sheets, strips, extruded or die-cut.

What Is the Best Choice for EMI Shielding?

This is only a brief overview of your choices for EMI shielding. Choosing the right EMI shielding metals and materials for your application depends on a variety of factors. It is difficult to know which is the best metal for the job without more information on the full scope and application functions. When discussing EMI RFI shielding, you should consider which frequencies the device operates under and needs shielding from, where the device will be operated, and finally, your budget.

The ID Group is pleased to offer several EMI RFI shielding solutions. We have the EMI products you need from conductive shielding gaskets to fingerstock gaskets.